

604.248	Catch Basin Type F6	Each
604.249	Catch Basin Type F6-C	Each
604.25	Catch Basin Type A5	Each
604.252	Catch Basin Type A5-C	Each
604.26	Catch Basin Type B5	Each
604.262	Catch Basin Type B5-C	Each

SECTION 605 - UNDERDRAINS

605.01 Description This work shall consist of the construction of underdrain, using pipe and filter material and pipe outlets in accordance with these specifications and the standard detail plans and in reasonably close conformity with the lines and grades shown on the plans or established.

605.02 Materials. Materials shall meet the requirements specified in the following Sections of Division 700 - Materials:

Granular Borrow	703.19
Underdrain Backfill Material	703.22
<u>Underdrain Pipe</u>	
Corrugated Polyethylene Pipe	706.06
Polyvinylchloride (PVC) Perforated Pipe	706.09
Corrugated Steel, Metallic Coated Pipe for Underdrain	707.05
Corrugated Aluminum Alloy Pipe for Underdrain	707.08
<u>Underdrain Outlet Pipe</u>	
Corrugated Polyethylene Pipe	706.06
Corrugated Steel, Metallic Coated Pipe for Underdrain	707.02
Corrugated Aluminum Alloy Pipe	707.06

Connections for polyethylene pipe shall be made with external wrap-around split couplings, screw-on type couplings, external snap-on couplings, or bell and spigot and ring gasket. External wrap-around split couplings shall be secured with heavy duty splicing tape or plastic or wire ties placed on each side of the coupling. External snap-on couplings shall comply with the appropriate section of AASHTO Specifications.

Connections for other plastic underdrain pipe shall be made with bell and spigot and ring gasket.

Connections for metallic underdrain pipe shall be made with corrugated metal bands secured with bolts. Dimpled bands shall not be used.

Other types of connectors for underdrain may be used upon approval by the Resident.

605.021 Fittings The material for elbows, tees and wyes for Underdrain pipe shall be at least as thick as the largest size pipe being connected.

605.03 General Underdrain pipe for Underdrain, Type B shall, at the Contractor's option, consist of any one of the following types:

- Corrugated Aluminum Alloy Pipe for Underdrain
- Corrugated Polyethylene Pipe for Underdrain (Smoothlined)
- Metallic Coated (Zinc or Aluminum Coated) Corrugated Steel Pipe for Underdrain
- Polyvinylchloride (PVC) Perforated Pipe

At the Contractor's option, underdrain pipe for Underdrain Type C shall consist of any one of the following types:

- Corrugated Aluminum Alloy Pipe for Underdrain
- Corrugated Polyethylene Pipe (Smoothlined)
- Metallic Coated (Zinc or Aluminum Coated) Corrugated Steel Pipe for Underdrain
- Polyvinylchloride (PVC) Perforated Pipe

605.04 Underdrain Construction

a. Underdrain, Type B The trench shall be excavated to the required width and depth and a bed of the specified granular material, 75 mm [3 in] in depth, prepared in the trench. 150 mm [6 in] perforated pipe shall be laid on this bed with the perforations as shown on the Standard Detail plans.

After the pipe has been firmly bedded and joints securely connected, it will be inspected before any backfill is placed. The remaining backfill shall be granular material meeting the same requirements as that used for bedding the pipe.

For underdrain placed under areas of proposed pavement, the material shall be placed in 200 mm [8 in] layers, loose measure and thoroughly compacted except that the initial layer of backfill around the pipe may be placed in a layer not exceeding 300 mm [12 in]. For underdrains placed under areas not proposed to be paved, the initial layer of backfill shall not exceed 300 mm [12 in] and the remaining material may be placed in one lift to the elevation of the subgrade and compacted with heavy rubber tired or vibratory compaction equipment to the satisfaction of the Resident.

The upstream end of all completed underdrain pipe shall be sealed with cement mortar or other acceptable material. Care shall be taken that soil does not enter the pipe. Pipe contaminated before backfilling shall be removed, cleaned, and re-laid.

b. Underdrain, Type C The trench shall be excavated to the width and depth as determined by the size and depth of the pipe to be installed.

The perforated pipe shall be laid to line and grade centered on the bottom of the trench with the perforations as shown on the Standard Detail plans.

After the pipe has been firmly bedded and all joints securely connected, it will be inspected before any backfill is placed. The backfill shall be placed in accordance with Section 603.08 and as shown on the Standard Detail plans using the materials specified.

When Underdrain Type B or Underdrain Type C is constructed, backfill material beyond the underdrain trench lateral limits designated on the plans shall be material conforming to the requirements of Granular Borrow, Underwater Backfill. Material within the underdrain trench limits shall conform to the requirements of the type underdrain being constructed. The Contractor shall take precautions to prevent the underdrain backfill material from becoming contaminated with clay, silts, organic matter, or other foreign matter. Methods of placing backfill material shall be limited to the use of equipment that will place material directly into the trench. Pushing material into the trench will not be allowed.

When underdrain is to be constructed in embankment fill, the excavation for the trench shall be done after the embankment has been completed to subgrade elevation.

605.05 Underdrain Outlets Trenches for underdrain outlets shall be excavated to the required width and depth. These outlets shall be metal pipe of the same size and wall thickness used in the underdrain, except that the perforations may be omitted.

The pipe shall be laid in the trench with all ends firmly joined by the applicable methods and means. After inspection and approval of the pipe installation, the trench shall be backfilled with suitable material in layers and compacted as provided for in Section 603.08.

605.06 Method of Measurement Underdrain and underdrain outlets will be measured by the length in meters [linear feet] along the centerline of underdrains and underdrain outlets of the types and sizes completed and accepted.

When elbows, tees, wyes, or other special fittings are required in underdrain, each fitting shall be included for payment as 1 additional meter [3 additional linear feet] of the largest pipe size involved.

605.07 Basis of Payment The accepted quantities of underdrains and underdrain outlets will be paid for at the contract unit price per meter [linear foot] of each type and size specified complete in place. Outlet pipe for Underdrain, Type C will be paid for under Section 603 - Pipe Culverts and Storm Drains.

Within and beyond the trench limits, backfill, couplings and bands and other related items will not be paid for separately, but shall be considered included in the unit bid price for the type of underdrain being installed.

Excavation will be measured and paid for as provided in Section 206 - Structural Excavation. No allowance for payment will be made for excavating or material excavated beyond the horizontal dimensions shown for Underdrain, Type B or Underdrain, Type C.

Payment will be made under:

Pay Item

Pay Unit

605.09	150 mm [6 in] Underdrain Type B	meter [Linear Foot]
605.10	150 mm [6 in] Underdrain Outlet	meter [Linear Foot]
605.11	300 mm [12 in] Underdrain Type C	meter [Linear Foot]
605.12	375 mm [15 in] Underdrain Type C	meter [Linear Foot]
605.13	450 mm [18 in] Underdrain Type C	meter [Linear Foot]
605.14	525 mm [21 in] Underdrain Type C	meter [Linear Foot]
605.15	600 mm [24 in] Underdrain Type C	meter [Linear Foot]
605.17	750 mm [30 in] Underdrain Type C	meter [Linear Foot]
605.18	900 mm [36 in] Underdrain Type C	meter [Linear Foot]

SECTION 606 - GUARDRAIL

606.01 Description This work shall consist of furnishing and installing guardrail components in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or as established. The types of guardrail are designated as follows:

Type 3-Galvanized steel "w" beam, wood posts or galvanized steel posts.

Type 3a-Galvanized steel "w" beam, wood posts, wood or composite offset brackets.

Type 3aa-Corrosion resistant steel "w" beam, wood posts, wood or composite offset brackets.

Type 3b-Galvanized steel "w" beam, galvanized steel posts, galvanized steel offset brackets.

Type 3c-Galvanized steel "w" beam, wood posts or galvanized steel posts, wood or composite offset brackets.

Type 3d-Galvanized steel "w" beam, galvanized steel posts, wood or composite offset brackets.

Thrie Beam-Galvanized steel thrie beam, wood posts or galvanized steel posts.

Median barriers shall consist of two beams of the above types, mounted on single posts. Except for thrie beam, median barriers may include rub rails when called for.

Bridge mounted guardrail shall consist of furnishing all labor, materials, and equipment necessary to install guardrail as shown on the plans. This work shall also include drilling for and installation of offset brackets if specified, back-up plates and